

Microstructure and Mechanical Properties of Al - Al₄C₃ Materials

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Abstract

Dispersion strengthened aluminium compacts have been prepared by powder metallurgy. The base microstructure is an aluminium matrix strengthened with dispersed particles. The strengthening is direct through dislocation movement retardation, and indirect through deformation induced by microstructure modification in the next technological steps. The method of mechanical alloying is described. Carbon transformation to carbide Al₄C₃ is characterised within different heat treatment schedules and nine commercial carbon powders tested. The micromechanism of carbon incorporation into the metallic powder, and the compacting of it are described. The influence of dispersed carbides on mechanical properties is evaluated together with the influence of deformation on microstructure and properties. Definition and properties microstructure (interparticle distance), ductility anomalies up to the type of superplasticity were observed at certain tensile strain rates.